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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/621,862	BOER ET AL.
	Examiner	Art Unit
	Leila Malek	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>02 July 2007</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-38</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) <u>35</u> is/are allowed.

6)☒ Claim(s) <u>1-34 and 36-38</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>09/22/2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)	5) ☐ Notice of Informal Patent Application
Paper No(s)/Mail Date _____ .	6) ☐ Other: _____ .

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments regarding to the USC § 103 rejection of claims 1, 16, 25, and 38 filed on 07/02/2007 have been fully considered but they are not persuasive.

Applicant's Argument: Applicant argues, on page 14, lines 23-28, that "Sano fails to teach or suggest the claimed limitation of generating a reference field based on a field of the received signal and on a <u>distinct</u> channel estimation signal".

Examiner's Response: Examiner asserts that Sano teaches generating a reference field (see Fig. 1, outputs of the fading compensating units) based on a field of the received signal (see the delayed version of the received signal) and on a distinct channel estimation signal (see the outputs of the channel estimation unit). Limitation "<u>distinct</u> channel estimation signal" is a broad limitation and can be interpreted in different ways. Channel estimation signal (the output of the channel estimator) is not the same as the received signal; therefore, channel estimation signal is distinct (or different) from the received signal.

Applicant's Argument: Applicant argues, on page 15, lines 24-26, that "Sano fails to teach or suggest the claimed limitation of measuring at least one characteristic corresponding to the at least one field in the received signal and generating a signal quality estimate as a function of the at least one characteristic corresponding to the at least one field in the received signal".

Examiner's Response: Examiner asserts that Sano teaches measuring at least one characteristic corresponding to the at least one field in the received signal (i.e.

measuring the signal to interference ratio) (see column 5, lines 56-58); and generating a signal quality estimate (see the outputs of the SIR blocks) as a function of the at least one field in the received signal (i.e. the delayed version of the field) and the generated at least one reference field (see the outputs of the fading compensation units, and column 6, lines 48-58).

Applicant's Argument: Applicant argues, on page 16, lines 22-26, that "Mobin fails to teach or suggest generating a signal quality estimate as a function of the branch metric".

Examiner's Response: Examiner asserts that Mobin disclose obtaining an estimate of the received signal (i.e. interpreted as generating a signal quality estimate) by using a branch metric processing (see column 10, lines 19-21).

2.   Applicant's arguments, regarding to the rejection of the following limitation has been fully considered and is persuasive. Therefore, a new ground(s) of rejection is made.

"generating a signal quality estimate as a function of a difference between the at least one characteristic corresponding the to the first field in the received signal and at least one threshold corresponding to the at least one characteristic".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 1, 5, 12-14, 16, 17, 25, 28, 33, and 38 are rejected under 35 U.S.C.

103(a) as being unpatentable over Sano (EP 1367752 (see the IDS cited by the

Applicant)), in view of Tzannes et al. (hereafter, referred as Tzannes) (US

2004/0047296).

As to claim 1, Sano discloses a method for estimating a signal quality (i.e.

estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6,

lines 56-58), the method comprising the steps of: receiving a signal from the wireless

communication channel (see Fig. 1), the received signal comprising at least one field

(i.e. the common pilot portion); generating at least one reference field (see the outputs

of the fading compensation blocks) based, at least in part, on the at least one field in the

received signal (see the outputs of the delay unit) and on a channel estimation signal

(see the outputs of the channel estimator) (see Fig. 1 and column 6, lines 44-48, see

the output of the), the channel estimation signal being distinct from the received signal

and representative of at least one characteristic of the wireless communication channel

(i.e. the SIR); and generating a signal quality estimate (see the outputs of the SIR

calculator blocks) as a function of the at least one field in the received signal (i.e. the

delayed version of the field) and the generated at least one reference field (column 6,

lines 48-58). Sano discloses all the subject matters claimed in claim 1, except that the

field is modulated and encoded in a substantially fixed manner. Tzannes discloses a

communication system, comprising two transceivers, wherein the second transceiver

returns to the first transceiver a positive acknowledgement that may or may not

comprise optimized communication parameters (see paragraph 0058). Tzannes

discloses that the packets communicated between transceivers comprise a header (i.e. a signal field) to correctly determine the packer duration (see paragraph 0064). Tzannes further discloses that the signal field is modulated according to the signal modulation encoding parameters for the standard signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding the field in a substantially fixed manner); therefore, the receiver can correctly receive a signal field bits (see paragraph 0066). It would have been obvious to one of ordinary skill in the art at the time of invention to use a fixed modulated and encoding technique for at least one part of the packet as suggested by Tzannes to ensure that the receiver can correctly receive the signal field which contains the important timing information and as the result maximize the communication data rate (see the abstract).

As to claim 5, Sano further discloses delaying of the at least one field in the received signal by an amount substantially equal to a latency associated with generating the at least one reference field (see column 6, lines 49-51).

As to claim 12, Tzannes discloses that at least a portion of the received signal is organized as an Institute of Electrical and Electronics Engineers (IEEE) standard 802.11 frame, the at least one field in the received signal comprising a SIGNAL field in the IEEE 802.11 frame (see paragraph 0066). It would have been obvious to one of ordinary skill in the art at the time of invention to allow the host to use different transmission rates by using the IEEE standard 802.11a and make the system more flexible.

As to claim 13, Sano further shows that channel estimation signal is obtained at least prior to generating the at least one reference field (i.e. outputs of the fading compensation unit) (see Fig. 1).

As to claim 14, Sano further shows that the received signal comprises at least one training symbol (i.e. the pilot symbol) and the channel estimation signal is computed based at least in part on the at least one training symbol in the received signal (see Fig. 1).

As to claim 16, Sano discloses a method for estimating a signal quality (i.e. estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6, lines 56-58), the method comprising the steps of: receiving a signal from the wireless communication channel (see Fig. 1), the received signal comprising at least one field (i.e. the common pilot portion); measuring at least one characteristic corresponding to the at least one field in the received signal (i.e. measuring the signal to interference ratio) (see column 5, lines 56-58); and generating a signal quality estimate (see the outputs of the SIR blocks) as a function of the at least one field in the received signal (i.e. the delayed version of the field) and the generated at least one reference field (see the outputs of the fading compensation units, and column 6, lines 48-58). Sano discloses all the subject matters claimed in claim 16, except that the field is modulated and encoded in a substantially fixed manner. Tzannes discloses a communication system, comprising two transceivers, wherein the second transceiver returns to the first transceiver a positive acknowledgement that may or may not comprise optimized communication parameters (see paragraph 0058). Tzannes discloses that the packets

communicated between transceivers comprise a header (i.e. a signal field) to correctly

determine the packer duration (see paragraph 0064). Tzannes further discloses that the

signal field is modulated according to the signal modulation encoding parameters for the

standard signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and

encoding the field in a substantially fixed manner); therefore, the receiver can correctly

receive a signal field bits (see paragraph 0066). It would have been obvious to one of

ordinary skill in the art at the time of invention to use a fixed modulated and encoding

technique for at least one part of the packet as suggested by Tzannes to ensure that the

receiver can correctly receive the signal field which contains the important timing

information and as the result maximize the communication data rate (see the abstract).

As to claim 17, Sano discloses that characteristic comprises signal to

interference ratio (or signal to noise ratio) of the at least one field in the received signal

(see column 5, lines 56-58).

As to claim 25, Sano discloses an apparatus for estimating a signal quality (i.e.

estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6,

lines 56-58), for generating at least one reference field (see the outputs of the fading

compensation units) (inherently by using a controller) based, at least in part, on the at

least one field and on a channel estimation signal (see Fig. 1 and column 6, lines 44-

48), the channel estimation signal being distinct from the received signal and

representative of at least one characteristic of the wireless communication channel (i.e.

the SIR); and generating a signal quality estimate (see the outputs of the SIR blocks) as

a function of the at least one field in the received signal (i.e. the delayed version of the

field) and the generated at least one reference field (see the outputs of the fading compensation, and column 6, lines 48-58). Sano discloses all the subject matters claimed in claim 25, except that the field is modulated and encoded in a substantially fixed manner. Tzannes discloses a communication system, comprising two transceivers, wherein the second transceiver returns to the first transceiver a positive acknowledgement that may or may not comprise optimized communication parameters (see paragraph 0058). Tzannes discloses that the packets communicated between transceivers comprise a header (i.e. a signal field) to correctly determine the packer duration (see paragraph 0064). Tzannes further discloses that the signal field is modulated according to the signal modulation encoding parameters for the standard signal field, i.e., 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding the field in a substantially fixed manner); therefore, the receiver can correctly receive signal field bits (see paragraph 0066). It would have been obvious to one of ordinary skill in the art at the time of invention to use a fixed modulated and encoding technique for at least one part of the packet as suggested by Tzannes to ensure that the receiver can correctly receive the signal field which contains the important timing information and as the result maximize the communication data rate (see the abstract).

As to claim 28, Sano further discloses that the step of delaying the at least one field in the received signal by an amount substantially equal to a latency associated with generating the at least one reference field (see column 6, lines 49-51).

As to claim 33, Sano further shows that channel estimation signal is obtained at least prior to generating the at least one reference field (i.e. output of the fading compensation units) (see Fig. 1).

As to claim 38, Sano discloses an apparatus for estimating a signal quality (i.e. estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6, lines 56-58), for generating at least one reference field (inherently by using a controller) based, at least in part, on the at least one field and on a channel estimation signal (see Fig. 1 and column 6, lines 44-48), the channel estimation signal being distinct from the received signal representative of at least one characteristic of the wireless communication channel (i.e. the SIR); and generating a signal quality estimate (See the outputs of the SIR blocks) as a function of the at least one field in the received signal (i.e. the delayed version of the field) and the generated at least one reference field (see the outputs of the fading compensation units and column 6, lines 48-58). Sano discloses all the subject matters claimed in claim 38, except that the field is modulated and encoded in a substantially fixed manner. Tzannes discloses a communication system, comprising two transceivers, wherein the second transceiver returns to the first transceiver a positive acknowledgement that may or may not comprise optimized communication parameters (see paragraph 0058). Tzannes discloses that the packets communicated between transceivers comprise a header (i.e. a signal field) to correctly determine the packer duration (see paragraph 0064). Tzannes further discloses that the signal field is modulated according to the signal modulation encoding parameters for the standard signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and

encoding the field in a substantially fixed manner); therefore, the receiver can correctly

receive a signal field bits (see paragraph 0066). It would have been obvious to one of

ordinary skill in the art at the time of invention to use a fixed modulated and encoding

technique for at least one part of the packet as suggested by Tzannes to ensure that the

receiver can correctly receive the signal field which contains the important timing

information and as the result maximize a communication data rate (see the abstract).

4.   Claims 2-4, 6, 26, 27, 29, and 34 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Sano and Tzannes, further in view of Mobin et al. (hereafter, referred

as Mobin) (US 6,522,696).

As to claims 2 and 26, Sano and Tzannes disclose all the subject matters

claimed in claims 1 and 25, except that the step of generating the signal quality estimate

comprises measuring a difference between one or more constellation points associated

with the at least one reference field and one or more corresponding constellation points

associated with the at least one field in the received signal. Mobin discloses a method

for determining channel estimation in a communication system (see the abstract). Mobin

further discloses that a viterbi decoder 114 determines the branch metric quality based

on measuring a difference between one or more constellation points associated with the

at least one reference field (e.g. I' and Q') and one or more corresponding constellation

points associated with the at least one field in the received signal (e.g. I and Q) (see

column 10, lines 19-32). It would have been obvious to one of ordinary skill in the art at

the time of invention to modify Sano and Tzannes as suggested by Mobin in order to

reduce frequency offset errors in a communication system (see column 1, last

paragraph).

As to claim 3, Mobin further discloses that the measured difference comprises a Euclidean distance (see column 10, line 28)). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as suggested by Mobin to reduce frequency offset errors in a communication system (see column 1, last paragraph).

As to claims 4 and 27, Mobin further disclose that the step of generating the signal quality estimate comprises the steps of: aligning the one or more constellation points associated with the at least one field in the received signal with the one or more corresponding constellation points associated with the at least one reference field; and generating difference signals for each of at least a portion of samples in the at least one field in the received signal, each of the difference signals being representative of a difference between the at least one field in the received signal and the corresponding at least one reference field (see column 10, lines 12-35). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a communication system (see column 1, last paragraph).

As to claims 6 and 29, Sano and Tzannes disclose all the subject matters claimed in claims 1 and 25, except for generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field; and determining a magnitude of the difference signal, the signal quality estimate being a function of the magnitude of the difference signal. Mobin discloses

generating a difference signal representative of a difference between the at least one

field in the received signal and the at least one reference field (see column 10, lines 12-

35); and determining a magnitude of the difference signal (see column 10, line 28), the

signal quality estimate being a function of the magnitude of the difference signal (see

line 30). It would have been obvious to one of ordinary skill in the art at the time of

invention to modify Sano and Tzannes as suggested by Mobin in order to reduce

frequency offset errors in a communication system (see column 1, last paragraph).

As to claim 34, Sano discloses an apparatus for estimating a signal quality (i.e.

estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6,

lines 56-58), for generating at least one reference field based (i.e. the outputs of the

fading compensation units) (inherently by using a processor), at least in part, on the at

least one field and on a channel estimation signal (see Fig. 1 and column 6, lines 44-

48), the channel estimation signal being distinct from the received signal and

representative of at least one characteristic of the wireless communication channel (i.e.

the SIR). Sano discloses all the subject matters claimed in claim 34, except that the field

is modulated and encoded in a substantially fixed manner. Sano also does not disclose

a comparator for generating a signal quality estimate as a function of the at least one

field in the received signal and the generated at least one reference field. As to the first

limitation, Tzannes discloses a communication system, comprising two transceivers,

wherein the second transceiver returns to the first transceiver a positive

acknowledgement that may or may not comprise optimized communication parameters

(see paragraph 0058). Tzannes discloses that the packets communicated between

transceivers comprise a header (i.e. a signal field) to correctly determine the packer duration (see paragraph 0064). Tzannes further discloses that the signal field is modulated according to the signal modulation encoding parameters for the standard signal field, i.e., 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding the field in a substantially fixed manner); therefore, the receiver can correctly receive a signal field bits (see paragraph 0066). It would have been obvious to one of ordinary skill in the art at the time of invention to use a fixed modulated and encoding technique for at least one part of the packet as suggested by Tzannes to ensure that the receiver can correctly receive the signal field which contains the important timing information and as the result maximize a communication data rate (see the abstract). As to the second limitation, Mobin discloses a method for determining channel estimation in a communication system (see the abstract). Mobin further discloses that a viterbi decoder 114 determines the branch metric quality based on measuring a difference between one or more constellation points associated with the at least one reference field (e.g. I' and Q') and one or more corresponding constellation points associated with the at least one field in the received signal (e.g. I and Q) (see column 10, lines 19-32). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a communication system (see column 1, last paragraph).

5.   Claims 7-9, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano, Tzannes, Mobin, further in view of Balachandran et al. (hereafter, referred as Balachandran) (US 6,215,827).

As to claims 7 and 30, Sano, Tzannes and Mobin disclose all the subject matters claimed in claims 6 and 29, except averaging at least a portion of magnitudes of difference signals corresponding to a plurality of samples in the at least one field in the received signal, each of the difference signals being representative of a difference between the at least one field in the received signal and the at least one reference field for a given one of the samples, the signal quality estimate being a function of the averaged magnitudes. Balachandran, in the same field on endeavor, discloses a system and method to measure channel quality in terms of signal to interference ratio (see the abstract). Balachandran further discloses using weighted (i.e. averaged) Euclidean distance metric as SIR metric (see column 7, lines 63). It would have been obvious to one of ordinary skill in the art at the time of invention to average magnitude of the difference signal to obtain a good estimated of the metric as suggested by Balachandran (see column 7, lines 52-53 and 61-63).

As to claims 8 and 31, Balachandran shows that the averaging step comprises adding a magnitude value corresponding to a present sample in the at least one field in the received signal to a magnitude value corresponding to a previous sample in the at least one field in the received signal (see column 7, lines 35-63). It would have been obvious to one of ordinary skill in the art at the time of invention to average magnitude of the difference signal to obtain a good estimated of the metric as suggested by Balachandran (see column 7, lines 52-53 and 61-63).

As to claim 9, Tzannes discloses uses SIGNAL field header in the packet (see paragraph 0066). According to the IEEE 802.11a standard, inherently this SIGNAL field contains 48 bits.

6. Claims 10 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano, Tzannes, Mobin, further in view of Li et al. (hereafter, referred as Li) (US 2003/0157914).

As to claims 10 and 32, Sano and Tzannes disclose all the subject matters claimed in claims 1 and 25, except for generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field; and determining a magnitude of the difference signal, the signal quality estimate being a function of the magnitude of the difference signal. Mobin discloses generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field (see column 10, lines 12-35); and determining a magnitude of the difference signal (see column 10, line 28), the signal quality estimate being a function of the magnitude of the difference signal (see line 30). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as suggested by Mobin to reduce frequency offset errors in a communication system (see column 1, last paragraph). Sano, Tzannes and Mobin disclose all the subject matters claimed in claims 10 and 32, except that instead of measuring the magnitude of the difference signal, power of the difference signal could be measured. Li discloses a communication apparatus wherein the residual interfering signal is removed to improve the quality of the received signal (see the

abstract). Li further discloses that the reception quality of the signal is continuously

monitored by checking the power or amplitude of each sub-band signal (see paragraph

0025). Since it is well known in the art that it is easier to measure the power of the

incoming signal instead of its magnitude; therefore it would have been obvious to one of

ordinary skill in the art at the time of invention to measure power of the incoming signal

to make the system more cost effective.

7.   Claims 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sano,

Tzannes, Mobin, Li, further in view of Balachandran.

        As to claim 11, Sano, Tzannes, Mobin and Li disclose all the subject matters .

claimed in claim 10, except averaging at least a portion of magnitudes of difference

signals corresponding to a plurality of samples in the at least one field in the received

signal, each of the difference signals being representative of a difference between the at

least one field in the received signal and the at least one reference field for a given one

of the samples, the signal quality estimate being a function of the averaged magnitudes.

Balachandran discloses a system and method to measure channel quality in terms of

signal to interference ratio (see the abstract). Balachandran further discloses using

weighted (i.e. averaged) Euclidean distance metric as SIR metric (see column 7, lines

63). It would have been obvious to one of ordinary skill in the art at the time of invention

to average magnitude of the difference signal to obtain a good estimated of the metric

as suggested by Balachandran (see column 7, lines 52-53 and 61-63). As already

disclosed in rejection of claim 10, Li discloses that the reception quality of the signal is

continuously monitored by checking the power or amplitude of each sub-band

signal(see paragraph 0025). Since it is well known in the art that it is easier to measure the power of the incoming signal instead of its magnitude; therefore it would have been obvious to one of ordinary skill in the art at the time of invention to measure power of the incoming signal to make the system more cost effective.

8.   Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sano and Tzannes, further in view of Balachandran.

As to claims 15, Sano shows that the received signal comprises a second field (i.e. a data field) (see Fig. 4), however, Sano and Tzannes fail to disclose that the second field having a variable modulation and encoding, and changing at least one of the modulation and the encoding of the second field based, at least in part, on the signal quality estimate. Balachandran, in the same field of endeavor, discloses a communication system apparatus comprising an encoded and modulation decision unit 258, which determines the correct encoding and modulation scheme in response to the received SIR estimate 274 from the receiver 261 (see column 14, lines 7-16). Balachandran further discloses that the adaptive channel encoder and modulator 256 then encodes and modulates the transmit data stream 252 to a predetermined scheme and transmits the information (interpreted as data) through the channel. It would have been obvious to one of ordinary skill in the art at the time of invention to adaptively change the transmission rate based on the feedbacks from the receiver to improve the efficiency of the system as suggested by Balachandran (see column 1, lines 25-38).

9.   Claims 18-20, 23, 24, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano, Tzannes, and Mobin, further in view of Balachandran.

As to claim 18, Sano discloses a method for estimating a signal quality (i.e.

estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6,

lines 56-58), the method comprising the steps of: receiving a signal from the wireless

communication channel (see Fig. 1), the received signal comprising at least one field

(i.e. the common pilot portion); generating at least one reference field (see the outputs

of the fading compensation units) based, at least in part, on the at least one field in the

received signal and on a channel estimation signal (see Fig. 1 and column 6, lines 44-

48), the channel estimation signal being distinct from the received signal and

representative of at least one characteristic of the wireless communication channel (i.e.

the SIR). Sano discloses all the subject matters claimed in claim 18, except that the field

is modulated and encoded in a substantially fixed manner. Sano also does not disclose

comparing the at least one field in the received signal with the at least one reference

field and generating a difference signal corresponding thereto; generating a signal

quality estimate as a function of the difference signal; and modifying the data

transmission rate of the transmitter based on the signal quality estimate. As to the first

limitation, Tzannes discloses a communication system, comprising two transceivers,

wherein the second transceiver returns to the first transceiver a positive

acknowledgement that may or may not comprise optimized communication parameters

(see paragraph 0058). Tzannes discloses that the packets communicated between

transceivers comprise a header (i.e. a signal field) to correctly determine the packer

duration (see paragraph 0064). Tzannes further discloses that the signal field is

modulated according to the signal modulation encoding parameters for the standard

signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding

the field in a substantially fixed manner); therefore, the receiver can correctly receive a

signal field bits (see paragraph 0066). It would have been obvious to one of ordinary

skill in the art at the time of invention to use a fixed modulated and encoding technique

for at least one part of the packet as suggested by Tzannes to ensure that the receiver

can correctly receive the signal field which contains the important timing information and

as the result maximize a communication data rate (see the abstract). As to the second

limitation, Mobin discloses a method for determining channel estimation in a

communication system (see the abstract). Mobin further discloses that a viterbi decoder

114 determines the branch metric quality based on measuring a difference between one

or more constellation points associated with the at least one reference field (e.g. I' and

Q') and one or more corresponding constellation points associated with the at least one

field in the received signal (e.g. I and Q) (see column 10, lines 19-32). It would have

been obvious to one of ordinary skill in the art at the time of invention to modify Sano

and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a

communication system (see column 1, last paragraph). Sano, Tzannes, and Mobin

disclose all the subject matters claimed in claim 18, except for modifying the data '

transmission rate of the transmitter based, at least in part, on the signal quality estimate.

Balachandran, in the same field of endeavor, discloses a communication system

apparatus comprising an encoded and modulation decision unit 258, which determines

the correct encoding and modulation scheme in response to the received SIR estimate

274 from the receiver 261 (see column 14, lines 7-16). Balachandran further discloses

that the adaptive channel encoder and modulator 256 then encodes and modulates the transmit data stream 252 to a predetermined scheme and transmits the information (interpreted as data) through the channel. It would have been obvious to one of ordinary skill in the art at the time of invention to adaptively change the transmission rate based on the feedbacks from the receiver to improve the efficiency of the system as suggested by Balachandran (see column 1, lines 25-38).

As to claim 23, Sano discloses a method for estimating a signal quality (i.e. estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6, lines 56-58), the method comprising the steps of: receiving a signal from the wireless communication channel (see Fig. 1), the received signal comprising at least one field (i.e. the common pilot portion); measuring at least one characteristic corresponding to the at least one field in the received signal (i.e. measuring the signal to interference ratio) (see column 5, lines 56-58). Sano discloses all the subject matters claimed in claim 23, except that the field is modulated and encoded in a substantially fixed manner. Sano also does not disclose generating a signal quality estimate as a function of the difference between the at least one characteristic corresponding to the first field in the received signal and at least one threshold corresponding to the at least one characteristic; and modifying at least one of the modulation and encoding of the second field base on the signal quality estimate. Tzannes discloses a communication system, comprising two transceivers, wherein the second transceiver returns to the first transceiver a positive acknowledgement that may or may not comprise optimized communication parameters (see paragraph 0058). Tzannes discloses that the packets

communicated between transceivers comprise a header (i.e. a signal field) to correctly

determine the packer duration (see paragraph 0064). Tzannes further discloses that the

signal field is modulated according to the signal modulation encoding parameters for the

standard signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and

encoding the field in a substantially fixed manner); therefore, the receiver can correctly

receive a signal field bits (see paragraph 0066). It would have been obvious to one of

ordinary skill in the art at the time of invention to use a fixed modulated and encoding

technique for at least one part of the packet as suggested by Tzannes to ensure that the

receiver can correctly receive the signal field which contains the important timing

information and as the result maximize a communication data rate (see the abstract). As

to the second limitation, Mobin discloses a method for determining channel estimation in

a communication system (see the abstract). Mobin further discloses that the sub-frame

bit error quality indication signal or channel quality indication signal corresponds to the

number of mismatches in the bits (interpreted as one characteristic of the received

signal) received form the channel encoder 44 and deinterleaver 36, or alternatively

equalizer 34. Mobin further discloses that the quality signal is declared acceptable by

automatic frequency correction unit 58, if the bit error count over a speech frame is

below a predetermined threshold (see column 7, lines 12, 13, and 33-39). It would have

been obvious to one of ordinary skill in the art at the time of invention to modify Sano

and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a

communication system (see column 1, last paragraph). Sano, Tzannes, and Mobin

disclose all the subject matters claimed in claim 23, except for modifying the data

transmission rate of the transmitter based, at least in part, on the signal quality estimate.

Balachandran, in the same field of endeavor, discloses a communication system

apparatus comprising an encoded and modulation decision unit 258, which determines

the correct encoding and modulation scheme in response to the received SIR estimate

274 from the receiver 261 (see column 14, lines 7-16). Balachandran further discloses

that the adaptive channel encoder and modulator 256 then encodes and modulates the

transmit data stream 252 to a predetermined scheme and transmits the information

(interpreted as data) through the channel. As to the limitation regarding a second field in

the data packet; Sano shows that the received signal comprises a second field (i.e. a

data field) (see Fig. 4), however, Sano, Tzannes, and Mobin fail to disclose that the

second field having a variable modulation and encoding, and changing at least one of

the modulation and the encoding of the second field based, at least in part, on the signal

quality estimate. Balachandran further discloses that the adaptive channel encoder and

modulator 256 then encodes and modulates the transmit data stream 252 to a

predetermined scheme and transmits the information (interpreted as data or second

field of data packet) through the channel. It would have been obvious to one of ordinary

skill in the art at the time of invention to adaptively change the transmission rate based

on the feedbacks from the receiver to improve the efficiency of the system as suggested

by Balachandran (see column 1, lines 25-38).

As to claim 24, Sano discloses that characteristic comprises signal to

interference ratio (or signal to noise ratio) of the at least one field in the received signal

(see column 5, lines 56-58).

As to claim 37, Sano discloses an apparatus for estimating a signal quality (i.e. estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6, lines 56-58), for generating at least one reference field (see the output of the fading compensation units) (inherently by using a controller) based, at least in part, on the at least one field and on a channel estimation signal (see Fig. 1 and column 6, lines 44-48), the channel estimation signal being distinct from the received signal and representative of at least one characteristic of the wireless communication channel (i.e. the SIR). Sano discloses all the subject matters claimed in claim 37, except that the field is modulated and encoded in a substantially fixed manner. Sano also does not disclose generating a signal quality estimate by comparing the at least one field in the received signal and the generated at least one reference field and to generate a difference signal, and modifying the data transmission rate of the transmitter based on the signal quality estimate. Tzannes discloses a communication system, comprising two transceivers, wherein the second transceiver returns to the first transceiver a positive acknowledgement that may or may not comprise optimized communication parameters (see paragraph 0058). Tzannes discloses that the packets communicated between transceivers comprise a header (i.e. a signal field) to correctly determine the packer duration (see paragraph 0064). Tzannes further discloses that the signal field is modulated according to the signal modulation encoding parameters for the standard signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding the field in a substantially fixed manner); therefore, the receiver can correctly receive a signal field bits (see paragraph 0066). It would have been obvious to one of ordinary

skill in the art at the time of invention to use a fixed modulated and encoding technique

for at least one part of the packet as suggested by Tzannes to ensure that the receiver

can correctly receive the signal field which contains the important timing information and

as the result maximize a communication data rate (see the abstract). As to the second

limitation, Mobin further discloses that a viterbi decoder 114 determines the branch

metric quality based on measuring a difference between one or more constellation

points associated with the at least one reference field (e.g. I' and Q') and one or more

corresponding constellation points associated with the at least one field in the received

signal (e.g. I and Q) (see column 10, lines 22-32). It would have been obvious to one of

ordinary skill in the art at the time of invention to modify Sano and Tzannes as

suggested by Mobin in order to reduce frequency offset errors in a communication

system (see column 1, last paragraph). Sano, Tzannes, and Mobin disclose all the

subject matters claimed in claim 37, except for modifying the data transmission rate of

the transmitter based, at least in part, on the signal quality estimate. Balachandran, in

the same field of endeavor, discloses a communication system apparatus comprising an

encoded and modulation decision unit 258, which determines the correct encoding and

modulation scheme in response to the received SIR estimate 274 from the receiver 261

(see column 14, lines 7-16). Balachandran further discloses that the adaptive channel

encoder and modulator 256 then encodes and modulates the transmit data stream 252

to a predetermined scheme and transmits the information (interpreted as data) through

the channel. It would have been obvious to one of ordinary skill in the art at the time of

invention to adaptively change the transmission rate based on the feedbacks from the

receiver to improve the efficiency of the system as suggested by Balachandran (see column 1, lines 25-38).

As to claim 19, Mobin further discloses that viterbi decoder 114 determines the branch metric quality based on measuring a difference between one or more constellation points associated with the at least one reference field (e.g. I' and Q') and one or more corresponding constellation points associated with the at least one field in the received signal (e.g. I and Q) (see column 10, lines 19-32). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano, Tzannes, and Balachandran as suggested by Mobin in order to reduce frequency offset errors in a communication system (see column 1, last paragraph).

As to claim 20, Mobin further disclose that the step of generating the signal quality estimate comprises the steps of: aligning the one or more constellation points associated with the at least one field in the received signal with the one or more corresponding constellation points associated with the at least one reference field; and generating difference signals for each of at least a portion of samples in the at least one field in the received signal, each of the difference signals being representative of a difference between the at least one field in the received signal and the corresponding at least one reference field (see column 10, lines 12-35). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as suggested by Mobin to reduce frequency offset errors in a communication system (see column 1, last paragraph).

10. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano, Tzannes, Mobin, and Balachandran, further in view of Li.

As to claim 21, Mobin discloses generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field (see column 10, lines 12-35); and determining a magnitude of the difference signal (see column 10, line 28), the signal quality estimate being a function of the magnitude of the difference signal (see line 30). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano, Tzannes and Balachandran as suggested by Mobin to reduce frequency offset errors in a communication system (see column 1, last paragraph). Sano, Tzannes, Balachandran and Mobin disclose all the subject matters claimed in claim 21, except that instead of measuring the magnitude of the difference signal power of the difference signal could be measured. Li discloses a communication apparatus wherein the residual interfering signal is removed to improve the quality of the received signal (see the abstract). Li further discloses that the reception quality of the signal is continuously monitored by checking the power or amplitude of each sub-band signal (see paragraph 0025). Since it is well known in the art that it is easier to measure the power of the incoming signal instead of its magnitude; therefore it would have been obvious to one of ordinary skill in the art at the time of invention to measure power of the incoming signal to make the system more cost effective.

As to claim 22, Balachandran, further discloses using weighted (i.e. averaged) Euclidean distance metric as SIR metric (see column 7, lines 63). It would have been

obvious to one of ordinary skill in the art at the time of invention to average magnitude of the difference signal to obtain a good estimated of the metric as suggested by Balachandran (see column 7, lines 52-53 and 61-63). As already disclosed in rejection of claim 10, Li discloses that the reception quality of the signal is continuously monitored by checking the power or amplitude of each sub-band signal (see paragraph 0025). Since it is well known in the art that it is easier to measure the power of the incoming signal instead of its magnitude; therefore it would have been obvious to one of ordinary skill in the art at the time of invention to measure power of the incoming signal to make the system more cost effective.

11.   Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sano, Tzannes, Mobin, and Balachandran, further in view of Shurvinton et al. (hereafter, referred as Shurvinton) (US 2005/0130595).

As to claim 36, Sano, Tzannes, and Mobin, disclose all the subject matters claimed in claim 34, except an integrator coupled to the comparator, the integrator being configurable for averaging at least a portion of magnitudes of difference signals corresponding to a plurality of samples in the at least one field in the received signal, each of the difference signals being representative of a difference between the at least one field in the received signal and the at least one reference field for a given one of the samples, the signal quality estimate being a function of the averaged magnitudes. Balachandran, in the same field on endeavor, discloses a system and method to measure channel quality in terms of signal to interference ratio (see the abstract). Balachandran further discloses using weighted (i.e. averaged) Euclidean distance

metric as SIR metric (see column 7, lines 63). It would have been obvious to one of ordinary skill in the art at the time of invention to average magnitude of the difference signal to obtain a good estimated of the metric as suggested by Balachandran (see column 7, lines 52-53 and 61-63). Sano, Tzannes, Mobin, and Balachandran disclose all the subject matters claimed in claim 36, except that an integrator is used to perform the averaging function. Shurvinton discloses a communication device comprising an integrator 21, which has been used to average out the amplitude variations of the incoming signal (see paragraph 0067). It would have been obvious to one of ordinary skill in the art at the time of invention to use an integrator to determine the average of the magnitude to reduce the error in the sampled power measurement as suggested by Shurvinton (see paragraph 0067).

Allowable Subject Matter

12.   Claim 35 allowed. The following is a statement of reasons for the indication of allowable subject matter: a comprehensive search of prior art of record failed to disclose, either alone or in combination, a circuit for estimating a signal quality of a signal received from a wireless communication channel, the received signal comprising at least one field that is modulated and encoded in a substantially fixed manner, the circuit comprising: a processor operative to generate at least one reference field based, at least in part, on the at least one field in the received signal and on a channel estimation signal, the channel estimation signal being representative of at least one characteristic of the wireless communication channel; and a comparator coupled to the processor, the comparator being configurable for generating a signal quality estimate as

• "a function of a difference between the at least one reference field and the at least one field in the received signal; wherein the processor comprises: a slicer configurable for receiving the at least one field in the received signal and recovering therefrom a plurality of received symbol bits associated with the at least one field; a decoder configurable for correcting one or more errors potentially present in the received symbol bits, the corrected received symbol bits corresponding to originally transmitted symbol bits in the at least one field; an encoder configurable for encoding the corrected received symbol bits; a modulator configurable for converting the encoded corrected received symbol bits to a baseband signal; and a multiplier configurable for combining the baseband signal and the channel estimation signal and generating the at least one reference field based at least in part on the baseband signal and on the channel estimation signal.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leila Malek whose telephone number is 571-272-8731. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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